

PIVOTING PANEL SYSTEM

BACKGROUND OF THE INVENTION

[0001] The present invention relates to pivoting panel systems and, more particularly, to pivoting panel systems that are advantageously used to mount dry erase marking boards. Dry erase marking boards are commonly used in offices, schools, and other locations where a chalkboard might otherwise be found, and comprise a generally rigid substrate such as fiberboard or metal having a surface coated with smooth, hard material. Suitable dry erase surfaces include, e.g., melamine, thermoset or thermoplastic materials, or enamel resin affixed to a backing. Such dry erase boards are characterized in that they typically have hard, white or gray surfaces that are very smooth in appearance, and are essentially nonporous. The surface operates to receive and releasably retain a marking composition thereupon.

[0002] The marking composition for use on dry erase boards typically comprises solvent-based ink, and the marker board surface has only a modest affinity for the dried ink. Therefore, the ink can be easily removed from the surface by wiping with an eraser, sponge or cloth.

[0003] Dry erase marking boards have a number of advantages over heretofore employed chalkboards, and their use has steadily increased in recent years. For example, dry erase marker boards provide a high contrast dark-on-light image, and can be used in combination with highly colored inks to produce a very readable,

high contrast display. Also, dry erase marker boards produce significantly less dust than do chalkboards. Since chalkboard dust has now been identified as a contributing factor in asthma and as a source of damage to computer equipment and the like, dry erase marker boards are rapidly replacing conventional chalkboards in schools and business places.

SUMMARY OF THE INVENTION

[0004] The present invention relates to a pivoting panel system. The panel system includes front and back panels preferably in the form of a front cover and a back cover, both having an inside surface comprising a dry erase panel. At least one, and preferably two or more, panels are located intermediate the front and back panels, with each of the intermediate panels preferably comprising a two-sided dry erase writing surface. Each of the front and back panels and the intermediate panels is pivotably mounted independently of the other about a common axis. In the preferred embodiment, the panel system includes a spine to which each of the front panel, back panel, and intermediate panels is pivotably connected. Additionally, the intermediate panel members are pivotably mounted to the spine about an axis that is spaced from the common axis of the spine, front panel and back panel.

[0005] In other aspects of the invention, the back panel preferably includes an adjustable jacking foot located near the spine for spacing the lower corner of the panel system adjacent the spine from the surface to which the system is mounted. In addition, a cooperating mounting bracket is provided

which is secured directly to the mounting surface for the panel system. A hanger for receiving the mounting bracket, so that the panel system may be used on partition walls that are less than full floor to ceiling height, is also provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Fig. 1 is perspective view of the pivoting panel system of the present invention, with the front cover closed.

[0007] Fig. 2 is a perspective view of the pivoting panel system of the present invention, with the front cover and intermediate panels partially turned.

[0008] Fig. 3 is a perspective view of the pivoting panel system, with the front cover open and a first pivoting panel turned.

[0009] Fig. 4 is a back view of the pivoting panel system of Fig. 1.

[00010] Fig. 5 is a side view of the pivoting panel system of Fig. 1.

[00011] Fig. 6 is an exploded fragmentary perspective view of the hinge system for the pivoting panel system of Fig. 1.

[00012] Figs. 7a-e are fragmentary views showing the sequence of turning or pivoting the first panel of the pivoting panel system of Fig. 1, with parts removed to show detail.

[00013] Fig. 8 is an exploded perspective view of an alternative embodiment of a hinge system for use in the present invention.

[00014] Fig. 9 is a plan view of a mounting bracket for use in the present invention.

[00015] Fig. 10 is an exploded perspective view showing the attachment of the pivoting panel system to the wall mount.

[00016] Fig. 11 is an exploded perspective view of a partition wall hanger for use in conjunction with the present invention.

[00017] Fig. 12 is an exploded perspective view showing the attachment of the wall mount to the partition wall hanger.

DETAILED DESCRIPTION

[00018] As required, a detailed description of a preferred embodiment of the present invention is disclosed herein. However, it is to be understood that the disclosed embodiment is merely exemplary of the invention, which may be embodied in various forms. Therefore, the specific details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriate manner.

[00019] The pivoting panel system of the present invention is like a book in that it has front and back panels in the form of covers with "pages" in between. With reference to the preferred embodiment, the two interior pages plus the inside front and back covers provide six surfaces on which dry erase markers may be used, although additional intermediate panels may be used to provide additional writing surfaces. The front cover preferably comprises a "self-healing" soft material so that it can be used as a tack board. As can be appreciated, the pivoting panel system provides a significantly greater amount of writing space than a dry-erase board having the same footprint as the

system. Specifically, having the writing surfaces configured in this way allows for maintaining a substantially more useable surface area (3 times the surface area in the case of the 2' x 3' panel system (36 sf) as opposed to a standard 4' x 3' board (having 12 sf)). Further, while allowing substantial additional writing surface, the system requires 50% less wall space when closed (2' x 3', or 6 sf). The pivoting panels allow for control of presentations by the turning of the panels, allowing the presenter to preserve and refer back to earlier writings. In addition, when the front panel is closed, privacy for the writings on the panels is provided.

[00020] Turning to Figs. 1-3, perspective views of the pivoting panel system, generally designated 10, in its closed condition (Fig. 1), open position (Fig. 3), and intermediate position (Fig. 2) are seen. The panel system 10 includes a front cover 12, a back cover 14, and two double-sided dry erase panels 16 (formed by, e.g., co-extrusion) therebetween. Although two panels 16 are shown, it is understood that the number of panels contained between the front and back covers 12, 14 may be varied without departing from the invention. Both the inside front cover 18 and inside back cover 20 comprise a dry erase writing surface, while the outside front cover 22 has an aesthetically-pleasing material mounted thereto. Thus, in the illustrated embodiment, six dry erase writing surface are provided. Preferably, the outside front cover is adapted to receive thumbtacks and the like, so that it can be used as a bulletin board. Of course, the outside front and back covers

could comprise dry erase surfaces without departing from the invention.

[00021] In the preferred embodiment, the back cover 14 is shown as being secured to a wall (preferably in the manner described in greater detail below), and the panel 16 and front cover 12 are pivotably secured to the back cover 14, thus the system may be opened in the manner of a book to gain access to the writing surfaces.

[00022] As illustrated, the height of the writing surfaces is less than the full height of the system, so that a tray 24 for holding markers may be secured to the back cover 14. Alternatively, a more traditional tray system may be provided in which the tray is secured to the flip book so as to hang below the lower edge of the back cover. Alternatively, the tray may be secured to the panel system by a telescoping member so that it is flush with the bottom of the panel system during shipment and can drop downwardly into a traditional stationary position while in use.

[00023] Each of the front and back panels or covers 12, 14, comprises an open frame within which is supported a dry erase writing surface. The individual frame members may be made of any rigid, light-weight, high-strength material. In a preferred embodiment, the vertical members are made of extruded aluminum, while the horizontal members are injection molded from a durable plastic, such as ABS, polycarbonate or impact styrene, the vertical and horizontal members being secured to each other by, e.g., screws, adhesive, etc. In addition to the writing

surface 20, the frame for the back cover 14 also supports a mounting surface 26 (best seen in Fig. 4) that is preferably vacuumed-formed or injection molded from a durable plastic. Similarly, the frame for the front cover supports the outer cover 22 in addition to the writing surface 18.

[00024] In keeping with one aspect of the invention, the front cover and intermediate pages pivot to open and close the panels independently of the each other about a common axis through approximately 180° of motion. To this end, a hinge system is provided that incorporates a central spine to which each of the front cover, back cover and intervening panels is independently pivotably connected.

[00025] With reference to Fig. 6, the hinge system, generally designated 28 is shown in an exploded fragmentary view. As can be appreciated, Fig. 6 illustrates only one end of a hinge system 28, the opposite end being substantially a duplicate thereof. Each of the front cover 12 and back cover 14 is provided with a spine 30, 32, respectively, generally described above as one of the vertical members of the open frames. The front cover spine 30 captures the inner edges of the front cover 12 and the inside front cover dry erase surface 18. The back cover spine 32 captures the inner edges of the back mounting surface 26 and the inside back cover dry erase surface 20.

[00026] Both the front cover spine 30 and the back cover spine 32 are pivotably connected to a center spine 42. Accordingly, a hinge cap 34, 36 is secured respectively to each of the front cover spine 30 and back cover spine 32 by a retaining screw

38. Each of the hinge caps 34, 36 has a central aperture for receiving a hinge/pivot pin 40 in the form of a screw that pivotably secures the front and back covers to the center spine 42. Sandwiched between the hinge caps 34, 36 and the center spine 42 are low-friction washers 44 (made of, e.g., Acetal, Nylon, Teflon, etc.) to permit easy relative rotation between each of the front cover 12, back cover 14, and center spine 42 and to reduce wear on the hinge components.

[00027] Each of the intermediate dry erase panels 16a, 16b is also pivotably secured to the center spine 42. To this end, each panel 16 is secured to a hinge 46 that captures the inner edge of the panel. Each hinge 46 includes an elongated bulb having a generally cylindrical cross-section that is received in a complimentarily-shaped slot in the center spine 42. Thus, when the bulb of the hinge 46 is received in the complementary slot in the center spine 42, the panel 16 is able to pivot about the elongated bulb of the hinge 46 to permit relative movement between the panel 16 and the center spine 42. In the illustrated embodiment, an angled web interconnects the bulb and the panel-securing portion of the hinge 46. The angled web insures that the pivoting panels 16 lie flat within the back cover when the panel system is closed.

[00028] As seen in Figs. 2 and 3, the intermediate panel 16 is not the full height of the panel system 10 in order to accommodate the marker tray at the bottom of the back cover 14. In such circumstances, a spacer 42a is secured in the center spine 42 below the hinges 46 to maintain the hinges 46 in place

in the center spine 42. As can be appreciated, the pivoting panels 16 could be retro-fitted to an existing conference room dry-erase panel system by providing a bracket that is secured to the hinge caps supporting the center spine 42 and hinge extrusions 46.

[00029] Turning to Figs. 7a-7e, the pivoting of an interior panel 16 is shown sequentially to illustrate the relationship between the hinge extrusions 46, a center spine 42, and the front and back covers 12, 14 of the pivoting panel system 10. To facilitate a clear understanding, the hinge caps 34, 36, which served to permit pivoting between the front and back covers, have been omitted from Figs. 7b-7e.

[00030] In Fig. 7a, the pivoting panel system 10 is open, with the front cover 12 to the left and the intermediate panels 16a, 16b both to the right, nested in the back cover 14. In Fig. 7b, panel 16a is first articulated with respect to center spine 42 about the axis of the elongated bulb, the center spine remaining stationary until panel 16a is articulated beyond 90° (Fig. 7c). Then, as seen in Fig. 7d, as the panel 16a continues to be turned toward the front cover 12, the center spine 42 rotates in unison with the panel 16a 90° about the axis of the center spine 42 until the panel 16a nests in the front cover 12. As can be seen, the panel 16b remains in place, nested in the back cover, throughout the turning of panel 16a. When the panel 16b is turned to the left, the action of the center spine is similar in that it remains stationary through the first 90° of articulation as the panel 16b pivots about the axis of the elongated bulb,

and then pivots in unison with the panel 16b through the second 90° of articulation about the axis of the center spine 42, as the panel 16b nests in the front cover 12.

[00031] An alternate hinge system, generally designated 48, is shown in Fig. 8. The hinge system 48 comprises a center spine 50 mounted for rotation with respect to a base 52 (which may be secured to a mounting surface by an appropriate bracket). To this end, a hub 54 having a boss 54a thereon is secured to the center spine 50 (by, e.g., screws) and an end cap 56 is secured to the base 52 (by, e.g., screws), the end cap 56 having an aperture 56a therein for capturing the end of the boss 54a. Thus, the center spine 50 is rotatable about an axis with respect to the base 52.

[00032] The double-sided dry erase panels 16a, 16b are mounted on hinge extrusions 58 that include a pivot pin 58a on the end thereof. The pivot pins 58a are captured in an apertures 54b in the hub 54, thus permitting the panels 16a, 16b to both pivot about the boss 54a (simultaneously with the center spine 50 as it rotates) and to pivot independently about their pivot pins 58a on an axis spaced from the axis of rotation of the center spine 50.

[00033] The front and back covers 12, 14 each include a hinge extrusion 60, to which is mounted a hinge 62. The hinges 62 each have a central aperture 62a which captures the boss 54a on the hub 54, the hinges 62 in turn being captured on the hub by the end cap 56. Thus, the front and back covers 12, 14 are mounted for independent rotation with respect to the

center spine 50 about the axis of rotation of the center spine.

[00034] The pivoting panel system can be wall mounted by either securing the spine to the wall (by, e.g., brackets) or by securing the back cover of the panel system to the wall by, e.g., toggle bolts, screw anchors, etc. As can be appreciated, the center of gravity of the pivoting panel system moves significantly as the front cover is open and the interior pages are flipped. This means that the system must be mounted in a way so that it does not tilt or "cartwheel" as it is opened. Thus, in keeping with another aspect of the invention, a bracket, generally designated 80, is provided for mounting the pivoting panel system to a wall, as shown in Figs. 9 and 10. The bracket 80 has a generally T- or Y-shaped appearance, with a vertical portion terminating on its upper end with a transverse portion. The bracket 80 is preferably formed of sheet metal and includes an elongated central channel 82 sized to be received in a complimentarily-shaped recessed 84 formed in the back 26. The lower end of the channel 82 includes opposed ears or flanges 86 that are received in a complimentary slot 88 in the back 26, so as to secure the lower end of the pivoting panel system 10 to the mounting bracket 80.

[00035] As best seen in Fig. 10, the upper, transverse portion of the mounting bracket 80 terminates in a lip 90 that includes a pair of slots 92, each slot 92 sized to receive the free end of a metal tab 94 that is secured to the back 26 by, e.g., rivets. The mounting bracket 80 includes a plurality of holes 96 for receiving fasteners to secure the mounting bracket to,

e.g., a wall. With the bracket 80 so mounted, the panel system 10 can be securely affixed thereto by aligning and locating the channel 82 in the bracket 80 with the recess 84 and the back 26, and then sliding the panel system downwardly so that the tabs 94 enter the slot 92 and the ears 86 lock onto the openings 88.

[00036] In certain settings, the pivoting panel system 10 may be used on walls that are less than full height, e.g., in office cubicles with partition walls separating adjacent cubicles. To this end, a hanger is provided that is adapted to support a mounting bracket (such as mounting bracket 80) that receives the pivoting panel system 10. The partition hanger has a first portion adapted to rest on the top edge of the partition wall and a second portion that hangs downwardly from the first portion for receipt of the mounting bracket.

[00037] With reference Figs. 11 and 12, such a partition hanger, generally designated 98, is shown. The first portion comprises an elongated, generally L-shaped member 100 that is located on the back edge of the partition wall, one leg of the L being flush with the back face of the partition wall, and the other leg of the L resting on the top edge of the partition wall. The member 100 is adapted to have one or more channels 102 (two shown) secured thereto that hang downwardly from the member 100 on the front face of the partition wall. The channels 102 have a series of spaced holes 104 to allow mounting the bracket 80 to the channels 102 at different heights. Alternatively, to allow for height adjustment, the channels 102 may comprise telescoping members or sliding track for

the bracket 80 (neither of which are shown) as would be apparent to one of ordinary skill in the art.

[00038] The upper ends of the channels 102 include a right-angle portion 104 that rests on the top of the partition wall. The channels 102 receive an elongated screw 106 that extends through the right-angle portions 104 to secure the channels 102 to the L-shape member 100 by way of tabs 108 formed thereon. As can be appreciated, partition walls of various widths can be accommodated by the use of the screws 106. Alternatively, the channels 102 may be connected to the member 100 by telescoping members, as mentioned above with respect to the downwardly-extending portions of the channels 100. Cover members 110 are provided that permit the partition hanger 98 to accommodate walls of varying width 106.

[00039] One of the benefits of the partition hanger 98 is that it also permits the pivoting panel system to be easily moved and relocated, as it is not permanently affixed to the partition wall. However, not permanently affixing the panel system to the partition wall also means the panel system may tilt as the front cover and pages are flipped because of the changing center gravity (i.e., the "cartwheel" effect discussed above). To prevent this from happening, the L-shape member 100 is sized in length to extend beyond the foot print of the closed panel system on the hinge side, thus providing a lever arm to resist such cartwheeling.

[00040] One problem that sometimes accompanies the use of large pivoting panel systems is that, when the cover is opened

or a page is turned, the subsequent page will follow due to the suction forces created between the adjacent pivoting panels. In keeping with another aspect of the invention, the pivoting panel system 10 is provided with means for counteracting the "page follow" that sometimes occurs as the panels are turned.

[00041] To this end, the back cover is provided with an adjustable jacking foot 112 (best seen in Figs. 4 and 5) adjacent the hinge system and the lower portion of the panel system. The jacking foot 112 is mounted on a threaded shaft so that it can be moved in or out with respect to the back cover 14 merely by rotating the foot. With the jacking foot 112 projecting beyond the plane of the back surface of the back cover, and the panel system attached to the wall, the jacking foot 112 cants the lower corner of the panel system adjacent the hinge away from the wall. This both slightly flexes the hinge system (which introduces some friction therein) and allows gravity to help resist the suction force between panels that causes page follow. Alternatively, the free corners of the pivoting panels could include magnets that would provide a force to oppose the suction force.

[00042] It will be understood that the embodiment of the present invention which has been described is illustrative of the application of the principles of the present invention. Numerous modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention, including combinations of the features that are individually disclosed or claimed herein.